

Effects of acquiring FSC forest management certification for Japanese enterprises using SmartWood Audits

Katsuaki SUGIURA • Takuyuki YOSHIOKA • Kouki INOUE

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Abstract: We explore the organizational, environmental, and economic effects of sustainable forest management (FM) certification by SmartWood (SW), one of the certification bodies accredited by the Forest Stewardship Council (FSC) to carry out certification in Japan. We closely investigated three enterprises: the Yusuhara Forest Owners' Cooperative, Yamanashi Prefectural Forest, and Ryujin-mura Forest Owners' Cooperative. Interviews with representatives of these entities provided crucial empirical information regarding the influence of certification on environmental assessment, rare-species protection, landscape-management planning, management objectives, and forest supervision. Attainment of FM status improved environmental awareness and engendered positive changes in assessing and managing forests and other natural resources but simultaneously imposed heavier economic costs.

Keywords: forest certification; forest management; FSC; required improvements; SmartWood

Introduction

Recent interest in sustainable forest management (FM) in Japan has led to an increase in the number of certified forests in the country since 2000. As of September 2009, the country had 27 such forests. In Japan, certification is granted by four organizations: Scientific Certification Systems (SCS), Société Générale de Surveillance (SGS), SmartWood (SW), and the Soil Association (SA). Each of these is accredited by the Forest Stewardship Council (FSC), which sets the standards for the certification process using ten general principles and 56 specific criteria.

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Katsuaki SUGIURA( • Takuyuki YOSHIOKA • Kouki INOUE
College of Bioresource Sciences, Nihon University, 1866 Kameino,
Fujisawa, Kanagawa 252-0880, Japan
Telephone: +81-466-84-3670; Fax: +81-466-84-3670
E-mail: sugiura.katsuaki@nihon-u.ac.jp

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Sugiura and Konohira (2005) indicated that while the weighing of evaluation criteria by each certification body is distinct, their educational and instructional evaluation methods share common traits. Newsom et al. (2006) explored the operational-level changes required for SW certification of forestry operations in the United States. Some studies of FM certification were undertaken under the auspices of the FSC (Hayami 2000, 2004; Kishi 2003), as have been independent case studies of certified forests in Japan (Kishimoto 2002; Nichiura and Yorimitsu 2003; Sugiura and Konohira 2005; Takebe 2005; Tomimura 2003). However, to the best of our knowledge, little research has been done on the changes in forest management that take place during or after the FSC FM certification process.

In this paper we investigate the nature of these changes in three Japanese forestry enterprises: 1) the Yusuhara Forest Owners' Cooperative in Kochi Prefecture; 2) Yamanashi Prefectural Forest; and 3) Ryujin-mura Forest Owners' Cooperative in Wakayama Prefecture, all of which have gained FSC FM certification through SW, which conducted its evaluations with different weighting of criteria and evaluation methods different from those used by the other certification bodies (Sugiura and Konohira 2005). Empirical evidence was collected through conversations with the representative persons in charge of FSC FM certification for these three enterprises.

Summary of Research Targets

The Yusuhara Forest Owners' Cooperative

The Yusuhara Forest Owners' Cooperative, which first acquired FSC FM certification under the group certification system in October 2000, manages a certified area of 2249 ha located in Yusuhara Township in Kochi Prefecture on the south coast of the island of Shikoku. The forest, which covers the steep hills surrounding the headwaters of the Shimanto River, occupies 91% of the township's land area. The forest was managed by the Yusuhara Forest Owners' Cooperative and comprised 94 private forests along with areas designated as national, prefectural, and

town forests (see Table 1). The number of forest owners participating in certification has been increasing as a result of the use of the *group certification system*, where the Cooperative as group manager organizes forest owners and coordinates certification-acquisition efforts.

At the time of its reassessment in 2005, the forested area managed by the Yusuhara Forest Owners' Cooperative comprised 855 private forests and three areas designated as national, prefectural, and town forests, amounting in all to 11,312 ha of certi-

fied forest. The number and area of forests has increased from the initial area granted certification in 2000 (SmartWood 2005; see Table 1).

Major industries in this part of Japan include agriculture and forestry, with the latter depending on plantation forests of *sugi* (*Cryptomeria japonica*) and hinoki cypress (*Chamaecyparis obtusa*; SmartWood 2000). The volume of timber harvested per year is increasing with the expansion of the certified forest area, as shown in Table 2.

Table 1. Forest area (ha) and ratios (%) by ownership at times of first Assessment and reassessment, and certification

Ownership	Yusuhara		Yamanashi		Ryujin	
	F	R	F	R	F	R
National forest	289.13 (12.9)	289.13 (2.6)				
Prefectural forest	94.83 (4.2)	94.83 (0.8)	143,000(100)	143,000(100)	329.1 (9.8)	
Municipal forest					630.86 (18.8)	*
Village forest	658.88 (29.3)	702.77 (6.2)				
Private forest	1,206.57 (53.6)	10,225.67 (90.4)			2,390.65 (71.4)	
Total	2,249.41 (100)	11,312.40 (100)	143,000(100)	143,000(100)	3,350.65 (100)	

Sources: FSC Japan (2005), SmartWood (2000; 2003a; 2003b; 2005), Soil Association (2011).

F: First assessment; R: Reassessment; *: No reassessment.

Table 2. Trends in harvested wood volume (m³)

Year	Yusuhara	Yamanashi	Ryujin
1998	3,153	37,875	—
1999	5,659	38,720	—
2000	3,100*	27,812	—
2001	—	—	—
2002	—	27,008	—
2003	—	32,208	—
2004	78,300	31,367	—
2005	68,623*	47,165	—
2006	—	51,106	—
2007	—	41,583	—
2008	—	42,702	—
Mean	31,767	37,755	10,000**

Sources: SmartWood (2000; 2003a; 2003b), Soil Association (2011).

—: no data, *: projected, **: Since there is no detailed data on annual harvested volume, annual mean harvested volume is shown.

The Yamanashi Prefectural Forest

The Yamanashi Prefectural Forest in Yamanashi Prefecture in central Honshu was first certified in April 2003 and consists of 143,000 ha, an area amounting to 32% of the prefecture's land area and 41% of its forested area (see Table 1). It is exclusively owned and managed by Yamanashi Prefecture. A crown forest from 1911 to 1956, this forest remains, thanks to good management, a natural low-altitude wooded area. Industrial forestry is conducted in plantation forests, where Japanese larch (*Larix kaempferi*), hinoki cypress (*Chamaecyparis obtusa*), and Japanese red pine (*Pinus densiflora*) are harvested (SmartWood 2003a).

Although the Yamanashi Prefectural Forest was undergoing

reassessment in 2008, there was no expansion of its area observed like that seen in the Yusuhara Forest Owners' Cooperative (see Table 1). It is also worth noting that the certification body has changed from SW to SA. The volume of timber harvested per year is shown in Table 2.

The Ryujin-mura Forest Owners' Cooperative

In August 2003, the forest managed by the Ryujin-mura Forest Owners' Cooperative in Wakayama Prefecture in central Honshu was FM-certified; an agreement was signed in which the 25 Ryujin-mura Forest Owners' Cooperative members, the Cooperative as a whole, Ryujin village, and Wakayama Prefecture participated in certification (see Table 1). The forest covers an area of 3,350.65 ha; located on steep terrain, it covers 95% of Ryujin village's land area. Its forest industry depends on plantation forests of *sugi* (*Cryptomeria japonica*) and hinoki cypress (*Chamaecyparis obtusa*) (SmartWood 2003b). The volume of timber harvested per year is shown in Table 2.

Improvements required by SW forest assessors

Each certification body releases a public assessment report on certified forests. Before proceeding with certification, major problems are listed in the report under the category "major requiring improvement" (major RI) and tagged as "preconditions" or "major corrective action requests" (Major CARs); smaller problems are listed either under "minor requiring improvement" (minor RI) and tagged as "conditions" or "Minor CARs," or under "advice" and tagged as "recommendations" or "observations." In this paper, we use the terms "major RI," "minor RI," and "advice." Items marked as major RIs must be improved be-

fore certification is granted, and those marked as minor RIs must be corrected within a stated period after certification.

The three enterprises considered in this paper had six RIs in common at the time of their respective first evaluation assessments (see Table 3); these improvements were mandatory for first-time FM certification. RIs required at annual audits are excluded. The six RIs are as follows: Criterion 6.1, “Assessment of environmental impacts and landscape-management planning”; Criterion 6.2, “Safeguards of conservation zones and protection areas for rare, threatened, and endangered species”; Criterion 7.1,

“Provision of management plan and supporting documents”; Criterion 8.1, “Procedures for monitoring comparative results and assessing change”; Criterion 8.2, “Management of research and data needed for monitoring”; and Criterion 8.3, “Provision of documentation to enable monitoring and certifying organizations to trace each forest product from its origin.” These RIs are the same as those used in the certification of other enterprises, although each certification body emphasizes the evaluation criteria of the FSC differently (Sugiura and Konohira 2005).

Table 3. FSC principles and criteria of required RIs of the three subject enterprises at time of first assessment and reassessment

Principles and criteria	Yusuhara		Yamanashi		Ryujin		Number of RIs		Principles and criteria	Yusuhara		Yamanashi		Ryujin		Number of RIs		
	F	R	F	R	F	R	F	R		F	R	F	R	F	R	F	R	
1.1	—	—	—	—	—	—	*	0	0	6.6	—	—	○	○	—	*	1	1
1.2	—	—	—	—	—	—	*	0	0	6.7	—	—	—	—	—	*	0	0
1.3	—	—	—	—	—	—	*	0	0	6.8	—	—	—	—	—	*	0	0
1.4	—	—	—	—	—	—	*	0	0	6.9	—	—	—	—	—	*	0	0
1.5	—	—	—	—	—	—	*	0	0	6.10	—	—	—	—	—	*	0	0
1.6	—	—	—	—	—	—	*	0	0	7.1	○	—	○	—	○	*	3	0
2.1	—	—	—	—	—	—	*	0	0	7.2	—	—	○ ¹	—	—	*	1	0
2.2	—	—	—	—	—	—	*	0	0	7.3	○	○	—	—	○	*	2	1
2.3	—	—	—	—	—	—	*	0	0	7.4	—	—	—	—	—	*	0	0
3.1	—	—	—	—	—	—	*	0	0	8.1	○	—	○	—	○	*	3	0
3.2	—	—	—	—	—	—	*	0	0	8.2	○	—	○	—	○	*	3	0
3.3	—	—	—	—	—	—	*	0	0	8.3	○	—	○ ¹	—	○	*	3	0
3.4	—	—	—	—	—	—	*	0	0	8.4	○	—	—	—	○	*	2	0
4.1	—	—	—	—	—	—	*	0	0	8.5	—	—	—	—	—	*	0	0
4.2	—	○	—	○	—	—	*	0	2	9.1	—	—	○ ¹	—	—	*	1	0
4.3	—	—	—	—	—	—	*	0	0	9.2	—	—	—	—	—	*	0	0
4.5	—	—	—	—	—	—	*	0	0	9.3	—	—	—	—	○	*	1	0
5.1	—	—	—	—	—	—	*	0	0	9.4	—	—	—	—	○	*	1	0
5.2	—	—	—	—	—	—	*	0	0	10.1	—	—	—	—	—	*	0	0
5.3	—	—	—	—	—	—	*	0	0	10.2	—	—	—	—	—	*	0	0
5.4	—	—	—	—	—	—	*	0	0	10.3	—	—	—	—	—	*	0	0
5.5	—	—	—	—	—	—	*	0	0	10.4	—	—	—	—	—	*	0	0
5.6	—	—	—	—	—	—	*	0	0	10.5	○	—	—	—	—	*	0	0
6.1	○	—	○	—	○	—	*	3	0	10.6	—	—	—	—	—	*	0	0
6.2	○	—	○	—	○	—	*	3	0	10.7	—	—	—	—	—	*	0	0
6.3	—	—	—	—	—	—	*	0	0	10.8	—	—	—	—	—	*	0	0
6.4	○	—	○	—	—	—	*	2	0	10.9	—	—	—	—	—	*	0	0
6.5	○	—	—	—	○	—	*	2	0									

Sources: SmartWood (2005), Sugiura and Konohira (2005), Soil Association (2011).

F: First assessment; R: Reassessment; ○: Criterion of required RIs; —: Criterion not used in any RIs; 1: We apply to FSC 10 principles and 56 criteria by the judgment of the authors from the contents of RIs which are not designated under FSC principles and criteria; *: No reassessment.

Method

In Japan, only these three business entities have acquired certification by SW to date. In addition, the Yusuhara Forest Owners’ Cooperative is the first certified Japanese forest owners’ cooperative, and the Yamanashi Prefectural Forest is the first certified public forest and the largest certified forest in Japan. The date of

the Ryujin-mura Forest Owners’ Cooperative’s certification was close to those of the other two enterprises. These three enterprises were targeted for these reasons.

Given that public assessment reports contain limited information, the present study bases its qualitative research on interviews. Questions were sent directly to the persons who had been in charge of FSC FM certification for the three enterprises, who responded in interviews (see Table 4). The questionnaire was

sent to the three enterprises in advance, and we interviewed the representatives onsite. The Yamanashi Prefecture representative was interviewed in May 2005, and the Yusuhara Forest Owners' Cooperative and Ryujin-mura Forest Owners' Cooperative representatives were interviewed in August 2005.

RIs were used as the basis of the interview questions in order to identify changes in forest-management practices upon certification. The questions focused in particular on SW's mandated RIs about the type and amount of activity in a forest and the planning implemented, other than provision of documentation (see Table 4), and dealt with methods of environmental-impact assessment; methods for the protection of rare, threatened, and endangered species; landscape-management planning; alterations in management strategies before and after certification; and impact of forest-management practices after certification. In addition, we asked why the three organizations had chosen the certifying body SmartWood.

Table 4. Interview questions

Questions
Question 1 How have you chosen the certifying body?
Question 2 How have you improved your method of assessing environmental impacts?
Question 3 How have you improved your methods of protecting rare, threatened, and endangered species?
Question 4 What is your landscape-management planning process?
Question 5 What changes took place in your management plan before and after certification?
Question 6 What effects did your enterprise have on the forest before and after certification?

Furthermore, RIs at time of reassessment were also investigated by evaluation of the public assessment reports, since the term of validity of FSC certification is five years.

Analysis of the impact of forest-management practices after certification was based the content of both the interviews and the public assessment reports. Since the subjective opinion of the representative of a certifying organization is the object of analysis, the results of this study may not objectively represent reality.

Results

The Yusuhara Forest Owners' Cooperative

Planning and Management

The Yusuhara Forest Owners' Cooperative learned of the FSC-certification process during a workshop on forest certification held by Kochi Prefecture in November and December 1998. Thereafter, the Cooperative decided to obtain FSC certification, since its ideas on forest management corresponded with the principles and criteria of the FSC. In May 1999, the workshop on FSC certification by SW was held in Yusuhara forest because the Forest Owners' Cooperative asked SW to verify the conditions of Yusuhara forest for certification. Following this initial contact,

the Cooperative contracted with SW to carry out the assessment.

The Cooperative has created its own Institute for Safety, Labor Relations Board, and Environmental Committee. The first body meets monthly, the second meets twice a year during the semi-annual National Safety Week each summer and autumn, and the Environmental Committee became active after the completion of the certification process and now meets five times per year.

Before the Cooperative received FM certification, it had not drawn up a landscape-management planning. It was required to introduce the plan within two years of certification, and it complied within the first year. The landscape-management planning affects both public and private property and contains summaries of the areas, histories, cultures, landscapes, and distribution and structure of the forests under the Cooperative's purview, as well as descriptions of plants, animals, and insects found within.

The Cooperative maintains that there are few differences between its forest-management plans before and after certification, since its policies were already in accordance with the FSC's environmental-conservation philosophy. Nevertheless, the addition of a rigorous environmental strategy, a rare-species list, and a landscape-management planning has led to increased awareness of environmental issues among its staff.

Environment

The Yusuhara Forest Owners' Cooperative has produced a management manual that outlines its methods for evaluating the environmental impact of its operations. The Cooperative made use of this resource prior to receiving FM certification. The environmental section of the manual contained a checklist for such tasks as weeding and brushing, improvement cutting, thinning, and final cutting. The Cooperative revised this section because it was deemed incomplete by SW assessors. A more demanding series of questions was introduced to evaluate the effect of operations on the natural environment. These included questions such as "In general, is there undergrowth in the forest land?" and "Is there a place within the forest in need of special attention with regard to conservation?" Plants, animals, and mountain streams were categorized by "impact" or "no impact." If a major environmental issue was identified, external specialists in animals and plants from the Forestry and Forest Products Research Institute, Wan-Park Kochi Animal Land, and Kochi Prefectural Makino Botanical Garden confirmed its exact location and suggested an appropriate change in the Cooperative's management plan.

The plan requires that identification and protection of rare plant and animal species be undertaken by operators who use forest-management checklists and photo cards carried by section leaders. If a habitat containing rare animals to be protected is identified by the operators, a survival strategy is developed based on the suggestions of the external specialists. In cooperation with the Forestry and Forest Products Research Institute, Wan-paku Kochi Animal Land, and Kochi Prefectural Makino Botanical Garden, these specialists provide additional information on the identification of the habitats of vulnerable and endangered species.

Economics

The benefits of certification, particularly the marketing of certified wood products, have not produced positive economic results. However, the town of Yusuhara has initiated a new approach to FSC certification: it pays to forest owners who have joined in the FSC certification program ¥100,000 per hectare for thinning. This subsidy has been in effect since 2003 (Ota 2005). According to the Cooperative's pamphlet "About Construction Support of Certified Wood Utilization," certified wood products are being promoted for use in the construction of houses. Kochi Prefecture and Yusuhara each offer subsidies of ¥100,000 to clients who build their houses with certified wood products. The goal of these subsidies is to promote the utilization of local wood products. However, there is no price premium on the certified wood products, although the certified forest area and the volume of timber harvested have increased as a result of such subsidies.

Yamanashi Prefectural Government

Planning and Management

The Yamanashi Prefectural Forest sought FSC certification for several reasons. It wished to demonstrate its adherence to international standards of forest management. At the same time, it hoped to better its forest-management practices. Achieving these first two objectives would allow the Yamanashi Prefectural Forest to enhance its image and reputation. Finally, certification would bestow the commercial benefits of distributing wood that had been certified.

The Yamanashi Prefecture made SW its certification body because SW has a link to the Japan Forest Technology Association (JFTA), which supports SW through designated competitive bidding. This is a method where two or more dealers are registered based on a certain standard, and contracts are concluded by competitive bidding between the dealers. In Japan, public works undertaken by a local government must be allocated by general or designated competitive bidding. Therefore, in order to find a certifying body in the case of reassessment, a designated competitive-bidding process was held, and SA was selected as the certifying body.

The prefecture's landscape-management planning has four objectives: 1) conservation and recovery of biodiversity; 2) adjustment of land use in areas around the forest; 3) assessment of water-resource conservation, and 4) increase in the financial value of the forest. Using the forest's geographic information system (GIS), landscape-management planning divides the forest into forty watersheds, each with an average surface area of 4,000 ha. Since the planning period was ten years and the demands of the FSC were not satisfied completely, a longer period is planned for the future.

The changes in forest management are positive for the forest in general, rare species and their habitats, and in particular landscape-management planning, because there was no management plan before FSC certification was sought. The prefecture now keeps records in these areas and is prepared to adapt its policy as necessary to protect them. However, the prefecture has not garnered reactions from its population, since the people of Yamanashi Prefecture are not well informed about FSC certification.

Environment

Yamanashi Prefecture also conducts an environmental-impact assessment of its forest reserve. Its checklist is broken down by location, natural history and culture, biodiversity, hydrological environment, and the condition of the surrounding area. Environmental effects of operations are ranked as "no impact," "low impact," "high impact," or a combination of these categories. The prefectural staff prepares these evaluations when conducting reforestation, building forest roads, and calculating wood yields. On the basis of these evaluations, the prefecture draws up medium- and long-term environmental-impact projections that conform to SW's conservation demands, as required by the SW certification audit.

The protection of rare animal and plant species is one of the stated goals. A workshop on rare species is held twice a year for prefectural staff engaged in forest management. These workshops focus on current conditions, the preservation of rare species, and distinguishing among species habitats. Rare species of plants and animals that have been identified as present within Yamanashi Prefecture are listed as "Prefectural Research Subject Species" in the federal Ministry of Environment's *Red Data Book*. Through the certification process, the staff of the Yamanashi Prefectural Forest has developed a more acute awareness of environmental issues.

Economics

The sale of certified wood products is limited. FSC Chain of Custody (CoC)-certified dealers handle only about 4,500 m³ of the wood produced in the Yamanashi Prefectural Forest per year. While there were eleven CoC-certified dealers in this administrative area as of May 2005, the prefecture does not sell only to them. Its lumber sells well because of its reputation for high quality. The lumber is marked with bands bearing the words "Yamanashi Prefectural Woods"; however, this wood does not fetch a premium price. Nevertheless, the Yamanashi Prefectural Forest pays the cost of FM certification from the profits on rented land and the sale of wood products, without depending on a prefectural tax.

The Ryujin-mura Forest Owners' Cooperative

Planning and Management

The Ryujin-mura Forest Owners' Cooperative first learned of the FSC-certification process when Hayami Forest in Mie Prefecture acquired FSC certification in 2000. The Cooperative considered the prospect of undergoing the certification process a good opportunity to review its forest-management policy. The Cooperative selected SW as its certifying body because of SW's ties to the JFTA. The Cooperative's president had personal contacts within the JFTA.

The landscape-management planning of the Cooperative was not fully developed at the time certification was granted. Therefore, it has been evaluated during an annual audit. The Cooperative is developing a landscape-management policy based on the

Ryujin-mura Landscape Framework, which had four objectives: 1) the conversion of unsuitable forest into coppice forest; 2) the conversion of plantation forest in the riparian zone into coppice forest; 3) the improvement of wildlife in the ecological corridor; and 4) the conversion of half of the forest to natural forest and secondary forest by the end of this century.

With the development of a new post-certification environmental plan for the forest, the conservation and environmental awareness of personnel has improved. They are also more conscious of safety issues when working in the forest. However, the Cooperative has also felt the burden of increased expenses.

Environment

The Ryujin-mura Forest Owners' Cooperative generated a "preliminary environmental impact-survey assessment report" (checklist) after obtaining FSC FM certification. Before operations begin, group leaders assess seven items in the forest: 1) waste treatment; 2) condition of rare animal and plant species; 3) effect of extraction; 4) regard for the watershed; 5) effect on fisheries; 6) regard for the buffer zone around the forest; and 7) effect on community residents. The outcome of each is marked as "impact" or "no impact." The report on onsite conditions is filled out when the operation process is half- or completely finished, along with an environmental impact-preliminary survey assessment report.

To further conservation, threatened organisms are pictured and listed under the heading, "Protection of rare species of plants and animals." If rare plants or animals are detected, they must be reported to the Cooperative's forest-certification representative. These provisions were introduced in order to qualify for certification. However, unlike the other two enterprises under consideration, the Ryujin-mura Forest Owners' Cooperative has not conducted workshops on rare species.

Economics

FM-certified wood products have not resulted in higher sale prices. This negative impact has led to the weakening of forest management, since the costs of certification have negatively affected profits. After it acquired certification, the Cooperative's business situation deteriorated. In order to acquire FM certification, it incurred the costs of assessment and of an annual audit. Since the Ryujin-mura Forest Owners' Cooperative has paid for its certification costs entirely through its business activities, this is an economic difficulty. In addition, while FSC CoC-certified dealers have bought approximately 5,000 m³ of the wood produced by the Cooperative per year, only a small percentage of the total amount of wood produced circulates in the market, because few CoC-certified dealers are located near Ryujin-mura. Therefore, the development of the certified-forest products market has been difficult.

The expense burden of an annual audit and the personnel-expense burden of assessment procedures weighed severely on Cooperative management. Moreover, since the merits of certification could not be seen, certification was canceled on December 31, 2005. The Ryujin-mura Forest Owners' Cooperative is the first case in Japan of stoppage of FSC certification.

RIs of Reassessment

The Yusuhara Forest Owners' Cooperative and Yamanashi Prefectural Forest have both undergone reassessment. At the times of reassessment, RIs were decreasing compared with the times of first certification (see Table 3). However, for both forests, some criteria were re-designated at reassessment. Yusuhara Forest Owners' Cooperative was required once again to attempt to meet criterion 7.3, "Similar levels of forest management in all areas of the forest." Yamanashi Prefectural Forest was required to attempt again to meet criterion 6.6, "Harmful chemicals prohibited," although the certification body was now SA rather than SW. The new RI applied to both enterprises was criterion 4.2, "The related laws and relevant regulations regarding health or safety of workers and their families are followed."

Discussion

The RIs required of these three enterprises by SW had in common Principles 6, 7, and 8 (see Table 4), which suggests that these principles had not yet been taken into consideration in Japanese forestry management. At the time of reassessment, the number of RIs was decreasing as a result of the changes noted in Table 3—although in the case of Yamanashi Prefectural Forest, assessment procedures may have changed with the change of the certifying body as compared with the time of first certification. Since adherence to RIs improved at the time of reassessment as compared to the time of first certification, we conclude that the management level of these enterprises was improved by the process of certification.

The results of this study show that all three enterprises have drawn up environmental checklists, which are employed before and after operations. The identification and protection of rare plant and animal species is facilitated with picture cards and lists, based on the opinions of external specialists and the lists in the *Red Data Book*. If a major environmental issue is found, the inspectors report it and external specialists are summoned for third-party input.

Other enterprises acquiring FSC FM certification have reported similar improvements in the documentation of and awareness of staff members regarding environmental- and forest-management issues. Kishi (2003) showed that staff members improved their awareness of the environment and their relations with their communities after acquiring FSC certification in college forests. Hayami Forest explicitly specified the terms of environmental-impact assessment in its management plan before its first certification (Hayami 2000). These results suggest that the environmental awareness of staff members and documentation of environmental-impact assessments should improve with certification.

Moreover, better landscape-management planning has also been implemented in accordance with the standards of the FSC. Data are collected on the biological and economic conditions of forests and their connected water systems. One conclusion based

on this result is that a primary function of landscape-management planning is to deal with zoning, with particular regard to medium- and long-term planning and using GIS to evaluate the following processes: 1) the conversion of unusable forest to natural forest and secondary forest; 2) the assessment and conversion of plantation forest in the riparian zone to coppice forest; 3) the conservation and recovery of biodiversity; 4) the adjustment of land use in areas around the forest; and 5) the increase in the financial value of the forest. It is necessary to introduce the abovementioned principles to landscape-management planning. Therefore, it might be complicated in general to carry out landscape-management planning in a certification context, as evidenced by the fact that it had not yet reached the level that FSC requests when these three enterprises acquired certification for the first time.

Certified wood products do not have a greater economic value than uncertified ones. A market for certified wood products has proven difficult to build for many other reasons, ranging from poor public relations to weak relations between producers and regional wood dealers, as well as the scarcity of such dealers. Ikuta (2002) showed that most people valued direct customer benefits such as durability and power consumption and fewer people valued indirect environmental benefits relating to, for example, global warming or recycling. Ikuta also showed that sufficient information is not available on all enterprises that manufacture and sell a product, allowing many of them to disregard environmental values. Therefore, it is essential that production-distribution and information-transmission systems for certified wood products be strengthened for forests that have attained FM certification.

Wood from Europe, North America, and Japan generally has little price premium (Hubbard and Bowe 2005; Humphries et al. 2001; Owari et al. 2006; Owari and Sawanobori 2007). On the other hand, the certification area of Yusuhara Town Owners' Cooperative has expanded since the support program has been implemented. Therefore, a subsidiary program for certified wood, such as the one offered by Yusuhara Township, may have positive economic effects of increased employment or price premiums on certified wood products in the future. Hayami (2004) highlighted remarkable results from a questionnaire administered by the Ministry of Agriculture, Forestry, and Fisheries in 2002, where 90% of the general public was aware of a 10% increase in certified wood prices, although the questionnaire results did not indicate consumption behavior. In particular, new markets in certified wood products are needed to finance increased costs. Similarly, for a small forestry enterprise such as the Ryujin-mura Forest Owners' Cooperative, a mechanism is needed to prevent certification from burdening economic activity. Although forest certification does not prove the quality of a product, forestry-management plans for producing good wood, as in the case of the Yamanashi Prefectural Forest, are important.

In the future, greater effort should be made to study the impact of certification on all forestry enterprises in Japan as well as the state of the certified wood market.

Conclusion

Overall, the environmental awareness of the staff members involved in forest management and forest-management documentation has improved in these three organizations. The strength of landscape-management planning has increased. However, FSC certification has not brought economic benefits through the sale of certified wood, and the costs of FM certification have been felt by each organization. The Yusuhara Forest Owners' Cooperative received a subsidy from Kochi Prefecture to help cover the costs of certification, whereas the Yamanashi Prefectural Forest is paying for certification with profits from land rental and the sale of wood products, without depending on a prefectural tax. For its part, the Ryujin-mura Forest Owners' Cooperative left the certification framework because of the economic burden of certification.

Although there is no increased price premium on certified wood products at the present, certified forests have increased in number since 2005, the year in which the authors interviewed the representatives of the three enterprises. Many enterprises that have newly acquired certification appear to have done so for a new purpose, not for the economic merit of certification but for the improvement it brings in the image of the enterprise.

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